

CLAIMS:

1. Method for identification of a changed state of a fluid with respect to a reference state of said fluid, the fluid having an optical parameter changing with the change of the state of the fluid, the method comprising:
 - 5 a) providing an optical arrangement including a transparent enclosure with at least a portion of said fluid, and an object observable through said optical arrangement, the arrangement being designed such that an image of said object in the changed state of the fluid (changed image) is optically distinctive from an image of said object in said reference state of the fluid (reference image) due to a change
10 of said optical parameter, at least one of said reference image and said changed image being predetermined;
 - b) illuminating said object with diffuse light;
 - c) observing a current image of said object through said optical arrangement along an optical axis; and
 - 15 d) comparing said current image with said predetermined image to identify said change in state of the fluid.
2. The method of Claim 1, wherein said reference image is predetermined.
3. The method of Claim 1, wherein step (d) is performed by a sensor with a logical circuit.
- 20 4. The method of Claim 1, wherein step (d) is performed by human's eye.
5. The method of Claim 4, wherein said predetermined image is visible in said optical arrangement along with said current image.
6. The method of Claim 1, wherein said comparing includes superimposing said predetermined image and said current image.
- 25 7. The method of Claim 1, wherein said diffuse light is in the IR or UV spectrum.
8. The method of Claim 7, wherein said optical arrangement further includes a converter to visible light so that step (c) can be performed in visible light.

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9. The method of Claim 1, wherein said optical parameter is refraction index of said fluid.
10. The method of Claim 9, wherein said enclosure constitutes a lens located at the optical axis of said optical arrangement, the lens having different optical power
5 when filled with said fluid in the reference and in the changed states.
11. The method of Claim 10, wherein said object comprises at least two gratings disposed in parallel planes spaced along said optical axis.
12. The method of Claim 11, wherein said gratings are a pair of Ronchi rulings.
- 10 13. The method of Claim 11, wherein said lens has negative power, said gratings and the eye being disposed on different sides of said lens.
14. The method of Claim 9, wherein said enclosure comprises a prism located on said optical axis.
- 15 15. The method of Claim 14, wherein said enclosure comprises a double prism located on said optical axis.
16. The method of Claim 9, wherein polarization angle of said fluid also changes with the change of the state of the fluid, and said optical arrangement includes two polarization filters, one at each side of said enclosure.
17. The method of Claim 16, wherein said two polarization filters are rotated at
20 90° with respect to each other.
18. An optical arrangement for identification of a changed state of a fluid with respect to a reference state of said fluid, the fluid having an optical parameter changing with the change of the state of said fluid, said arrangement comprising
- a) a transparent enclosure adapted to be filled with at least a portion of said
25 fluid;
 - b) an object observable through said enclosure;
 - c) an optical system having an optical axis and enabling the observation of said object when illuminated by diffuse light, via said enclosure filled with said fluid;

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the optical arrangement being designed such that an image of said object observed in the changed state of the fluid is optically distinctive from an image of said object observed in said reference state of the fluid due to a change of said optical parameter, at least one of said reference image and said changed image being predetermined, so that said identification can be performed by comparing a current image of said object to the predetermined image.

19. The optical arrangement of Claim 18, further comprising a source of diffuse light.

20. The optical arrangement of Claim 19, wherein said diffuse light is in the UV or IR spectrum.

21. The optical arrangement of Claim 20, further comprising a converter to visible light.

22. The optical arrangement of Claim 18, further comprising a sensor with a logical circuit adapted to perform said identification.

23. The optical arrangement of Claim 18, wherein said optical parameter is the refraction index of the fluid.

24. The optical arrangement of Claim 23, wherein said transparent enclosure, when filled with said fluid in the reference state, constitutes a lens or a prism with zero power.

25. The optical arrangement of Claim 23, wherein said transparent enclosure, when filled with said fluid in the changed state, constitutes a lens or a prism with zero power.

26. The optical arrangement of Claim 23, wherein said observable object comprises at least two gratings disposed in parallel planes spaced along said optical axis.

27. The optical arrangement of Claim 26, wherein said gratings are a pair of Ronchi rulings.

28. The optical arrangement of Claim 23, wherein said optical system is adapted to form said current image on the retina of the eye.

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29. The optical arrangement of Claim 23, further comprising a screen, said optical system being adapted to form said current image on said screen.
30. The optical arrangement of Claim 18, further comprising a record of said predetermined image.
- 5 31. The optical arrangement of Claim 30, wherein said record is a verbal description or a picture of said predetermined image available to a human observer before visual identification.
32. The optical arrangement of Claim 30, further comprising means for demonstration of said record to a human observer simultaneously with said current
10 image.
33. The optical arrangement of Claim 30, further comprising means adapted to superimpose said record of predetermined image and said current image.
34. The optical arrangement of Claim 23, wherein said transparent enclosure has the form of a lens or a double prism with minimal thickness at said optical axis.
- 15 35. The optical arrangement of Claim 23, wherein polarization angle of said fluid also changes with the change of the state of the fluid, and said optical arrangement includes two polarization filters, one at each side of said enclosure.
36. The optical arrangement of Claim 35, wherein said two polarization filters are rotated at 90° with respect to each other.
- 20 37. The optical arrangement of Claim 23, wherein said transparent enclosure is defined at least from one side by an aspheric lens.